Available online at www.sciencedirect.com
SCIENCE DIRECT
Colloids and Surfaces B: Biointerfaces 45 (2005) 104–107
COLLOIDS AND SURFACES B
www.elsevier.com/locate/colsurfb

Activity and structural changes of mushroom tyrosinase induced by *n*-alkyl sulfates

N. Gheibi [a], A.A. Saboury [a,*], K. Haghbeen [b], A.A. Moosavi-Movahedi [a]

[a] *Institute of Biochemistry and Biophysics, University of Tehran, Tehran, Iran*
[b] *The National Research Center for Genetic Engineering and Biotechnology, Tehran, Iran*

Received 17 May 2005; received in revised form 30 July 2005; accepted 6 August 2005

Abstract

Catecholase activity and structural changes of mushroom tyrosinase (MT) were studied in the presence of some *n*-alkyl sulfate derivatives. Experiments showed that MT reached its optimal activity in the presence of 1.5, 0.6, and 0.2 mM of sodium *n*-octyl sulfate (SOS), sodium *n*-dodecyl sulfate (SDS) and sodium *n*-tetradecyl sulfate (STS), respectively. Native and incubated MT with the *n*-alkyl sulfates were also investigated from structural point of view by far-UV circular dichroism (CD) and intrinsic fluorescence spectroscopy. At the above mentioned concentrations of SOS, SDS, and STS no change in the secondary structure of MT was observed. However, changes in the tertiary structure of the enzyme due to the presence of *n*-alkyl sulfates were obvious. Results of this research indicate that *n*-alkyl sulfate with longer chain induces greater conformational changes in MT, hence, can activate it at lower concentrations.

Keywords: Mushroom tyrosinase; *n*-Alkyl sulfates; Activation; Circular dichroism; Fluorescence; Conformational change

1. Introduction

Tyrosinase (EC 1.14.18.1) is a bifunctional enzyme, which catalyzes *ortho*-hydroxylation of monophenols (cresolase activity) and oxidation of catechols to the corresponding *ortho*-quinones (catecholase activity) [1]. *O*-Quinones follow some other enzymatic and nonenzymatic reactions, which result in formation of biopolymers like melanin. This macromolecule, the most famous product of tyrosinase, is the natural pigment of mammalian hair, eye, and skin [2,3]. Undesirable browning of fruits and vegetables during post-harvest handling has also been ascribed to tyrosinase [4]. Mushroom tyrosinase (MT) from the edible species, *Agaricus bisporus*, is a tetramer, two H subunits (43 kDa) and two L subunits (13 kDa), with a molecular mass of 120 kDa containing two active site [5].

It has been reported that the extracted tyrosinases from different sources are usually in latent status, which can be activated by various methods. For instance; MT can be activated by acid shock [6,7], fatty acids [8,9], alcohol [10], proteases [11,12] and anionic detergents such as SDS [13–17].

In pursuit of our previous work [18,19], it was the aim of this research to investigate the impact of the hydrophobic moiety of *n*-alkyl sulfate derivatives on tyrosinase activation by means of kinetic and spectroscopic studies.

2. Experimental

2.1. Materials

MT, specific activity 3400 units/mg, was purchased from Sigma. Caffeic acid was taken from the authentic samples. Analytical grade of sodium *n*-octyl sulfate (SOS), sodium *n*-dodecyl sulfate (SDS) and sodium *n*-tetradecyl sulfate (STS) were used. Phosphate buffer (10 mM, pH 6.8) was used throughout this research and the corresponding salts were obtained from Merck. All experiments were carried out in 20 °C. Our colleagues experiment on the Sigma tyrosinase

* Corresponding author. Tel.: +98 21 6956984; fax: +98 21 6404680.
E-mail address: saboury@ut.ac.ir (A.A. Saboury).

0927-7765/$ – see front matter © 2005 Elsevier B.V. All rights reserved.
doi:10.1016/j.colsurfb.2005.08.001